

REMARKSI. Introduction

In response to the Office Action mailed on December 28, 2004, claims 2, 6, 14, and 20 have been amended and claims 22 and 23 have been added. Claims 1, 3 - 5, 7 - 13, 15 - 19, and 21 have been retained as originally filed.

The subject-matter of amended claim 2 and new claims 22 and 23 is originally disclosed, e.g., on page 4, lines 10 - 11 and in the paragraph from page 4, line 30 to page 5, line 3 of the application.

The subject-matter of amended claims 6, 14 and 20 is originally disclosed, e.g., on page 11, lines 1 - 5 of the application.

Claims 1 - 23 as set forth in the attached claim listing are respectfully submitted for re-examination and re-consideration.

II. Claim Rejections under 35 U.S.C. § 112, first paragraph

In section (2) of the Office Action, claims 1 - 21 were rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement.

Applicant's attorney respectfully traverses the rejection in light of the following arguments.

The first objection concerned lines 5 - 7 on page 10 of the application, which state: "*An object of the 3D model is selected as the first step 60 of the method. For example, the selection may take place in order of decreasing distance of the object from the viewer such that the suppression of hidden lines is facilitated.*"

As mentioned on page 9, lines 30 - 32, Fig. 3 shows a flow diagram of a method that is automatically performed by a computer under control of a CAD program. Step 60 of Fig. 3 concerns the automatic selection of a first (or next, respectively) object of the 3D model that is processed when the 2D view is created. This selection is necessary because the 3D model will usually contain a plurality of objects that should all be represented in the 2D view. According to the above sentence, in some embodiments the selection will take place in order of decreasing distance of the object from the viewer, i.e., first selecting the object that is farthest away from the viewer and then progressively selecting closer objects. This facilitates the suppression of hidden lines since any 2D representation that is generated from a later selected – i.e., closer – object will just overlap or cover 2D representations that have been generated earlier from farther away objects of the 3D model.

It is further submitted that the sentence on page 10, lines 5 - 7 of the application just gives an example of a possible order of selection according to which the objects of the 3D model may be processed. The skilled person will appreciate that different selection orders are possible.

The second objection in the Office Action concerned lines 7 - 10 on page 10 [apparently not page 7] of the application, which state: "*When the selected object is determined, a check is made in test 62 whether or not a 2D representation of the object is available that is suitable for the 2D view to be created.*"

The Examiner objected that the criteria for determining whether or not a specific representation is suitable were not defined, nor was the method of running the test to ascertain suitability described.

In response, it is submitted that the very next sentence of the specification describes the criteria that are used in some embodiments for determining whether a specific representation is suitable and that are tested to ascertain suitability. This sentence, on page 10, lines 10 - 13, reads: "*In the course of this checking operation, in particular the direction of view of the 2D view, the classification of the view as a sectioned or non-sectioned representation and user-defined options regarding the kind of the representation are evaluated.*"

Further clarification on these issues is given in the section from page 5, line 26 to page 6, line 27, and also in the section on page 9, lines 19 - 27. The section on page 9, lines 19 - 27 describes the directory 50 shown in Fig. 2, which contains a number of different 2D representations of the object 32 for each of a number of different kinds of 2D views (e.g., front view, top view, and so on).

Again, it is submitted that the above are just exemplifying criteria in some embodiments while other possible criteria and methods of ascertaining suitability will be immediately apparent to the skilled person.

III. Claim Rejections under 35 U.S.C. § 112, second paragraph

In section (4) of the Office Action, claims 2, 4, 6, 7, 14 and 20 were rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Applicant's attorney respectfully traverses the rejection in light of the following arguments.

With respect to claim 2, the Examiner objected to the term "symbolic representation". In the presently amended claim 2 – and corresponding new claims 22 and 23 –, it has been clarified that the predefined 2D representation of the object is different from any calculated 2D projection of the object. Page 4, lines 10 - 11 and paragraph from page 4, line 30 to page 5, line 3. It is submitted that the objection has become moot by this amendment.

In connection with the objection raised against the wording of claim 2, the Examiner stated that a 2D view or representation was generally a view of a 3D object, taken from a given position and projected onto a 2D surface. In order to avoid any possible misunderstanding, it is emphasized that, in the terminology of the present application, this is not necessarily the case. Instead, the predefined 2D representation as used in the present application and invention is, in principle, not subject to any limitation and may comprise more or less or different pieces of information than the object of the 3D model. Page 4, line 30 to page 5, line 3.

In response to the objection raised against the wording of claim 4, it is submitted that the 3D model will usually contain a plurality of objects, which are arranged in a spatial relation as defined in the 3D model. When generating the 2D view, a 2D representation or a 2D projection will be accessed or calculated for each of these objects. It is apparent that objects in a model that are closer to the viewer may overlap or even completely obscure objects that are more distant from the viewer. When generating the 2D view of the 3D model, it is therefore desirable to perform some hidden line calculation so that only those parts of a 2D representation or a 2D projection are shown in the 2D view that are also visible when the spatial arrangement of the objects in the 3D model according to the chosen direction of view is considered.

With respect to claims 6, 14, and 20, the Examiner raised an objection against the claim language that the 2D representation was used as a flat object when generating the 2D view.

In present amended claims 6, 14, and 20, it has been clarified that not a later use of some solid model is meant, but rather step 68 of Fig. 3 of the present application. As described in the section from page 10, line 23 to page 11, line 6 of the present application, the predefined 2D representations are actually used as flat objects when generating the 2D view. By suitably arranging ("stacking") the flat objects in a direction perpendicular to the plane of the 2D view, suppression of hidden lines is possible with very little effort since the normal mechanisms for suppressing hidden lines that are already provided in the CAD program can be re-used. This means that no special treatment and no special algorithms are necessary for performing hidden line calculations in 2D drawings, thus making the implementation of the present invention much easier. Further details

about the use of flat objects and hidden line calculations are given in the section from page 7, line 7 to page 8, line 4 of the present application.

IV. Prior Art Rejections under 35 U.S.C. §102(b)

In section (6) of the Office Action, claims 1 - 21 were rejected under 35 U.S.C. §102(b) as being anticipated by Watanabe et al., U.S. Patent No. 5,701,403 (Watanabe).

Applicant's attorney respectfully traverses the rejection in light of the following arguments.

Watanabe discloses a CAD system that has a program section for building a 3D product model on the basis of a 2D drawing. First sentence of abstract. This is the opposite of the present invention which concerns the generation of a 2D view from a 3D model. Applicant therefore respectfully disagrees with the assessment in section (6) of the Office Action that Watanabe disclosed a CAD system utilized to obtain 2D objects from a 3D model or object.

The flow diagram of Fig. 30 of Watanabe concerns the operation of determining the correct place of a 3D object to be inserted into the 3D model on the basis of a 2D drawing. Column 37, lines 58 - 59 and column 37, lines 20 - 22. Fig. 29(b) and (c) show an example of operation of the method of Fig. 30 wherein the position of the 3D object 324 with respect to a direction perpendicular to the view plane 308 is to be determined. For this purpose, the CAD system temporarily creates a two-dimensional figure by a projection of the 3D object onto a different view plane 309. Column 37, lines 20 - 57.

Steps ST57 - ST59 are mentioned in section (6) of the Office Action. These steps detail the above operations. Column 38, lines 21 - 56. Step ST57 concerns the generation of the temporary two-dimensional figure in the auxiliary view plane 309. However, this 2D projection is just used in order to obtain a suitable translation vector for arranging the 3D object 324 in the model to be generated. In contrast to the present invention, there is no operation of choosing between this generated 2D projection and a predefined 2D representation in a 2D view to be created.

Summing up, the teaching of Watanabe is entirely different from the present invention because Watanabe does not address the problem of generating a 2D view of a 3D model and does not teach to choose between a predefined 2D representation of an object of the 3D model – if such a predefined 2D representation is available – and a calculated 2D projection of the object.

Thus, Applicant submits that independent claims 1, 10 and 16 are allowable over Watanabe. Further, dependent claims 2 - 9, 11 - 15, and 17 - 23 are submitted to be allowable over Watanabe in the same manner, because they are dependent on independent claims 1, 10, and 16, respectively, and thus contain all the limitations of the independent claims. In addition, dependent claims 2 - 9, 11 - 15, and 17 - 23 recite additional novel elements not shown by Watanabe.

V. Prior Art Rejections under 35 U.S.C. §103(a)

In section (8) of the Office Action, claims 1 - 21 were rejected under 35 U.S.C. §103(a) as being unpatentable over Baran et al., U.S. Patent No. US 6,603,486 B1 (Baran) in view of Itoh et al., U.S. Patent No. 5,692,115 (Itoh).

Applicant's attorney respectfully traverses the rejections in light of the following arguments.

Baran discloses a display program that facilitates viewing and understanding of design drawings that have a plurality of 2D views. Column 1, lines 30 - 52 and column 4, lines 49 - 51. Examples of the user assistance functions provided by Baran include:

- Placing selected views near each other on the screen and hiding views that are not selected - Column 5, lines 7 - 9.
- Providing a pointer for simultaneously pointing to the same point of a viewed object as the point appears in more than one view on a computer screen - Column 5, lines 42 - 45.
- Animating drawings for rotating a 3D depiction of a model about an axis of rotation and highlighting a 2D view when the view is coincident with the plane of the drawings - Column 6, lines 4 - 8.

Fig. 15 of Baran shows a proposed file format for an electronic drawing file 122. The electronic drawing file 122 contains a plurality of view records 134 - 136 and a tessellated model data record 138. The tessellated model data record 138 includes data corresponding to a 3D tessellated view while each of the view records includes corresponding 2D data for a corresponding view. Column 7, lines 7 - 28.

In section (8) of the Office Action, column 11, lines 11 - 31 of Baran has been cited. This paragraph, which refers to Fig. 21, describes the process of converting a 2D file, such as a file created using AutoCAD software, by reformatting it into a generic file 306. The generic file 306 is converted by an interpreter 308 into an electronic drawing file that corresponds to the drawing file 122 shown in Fig. 15 and described above. Column 11, lines 41 - 53.

Baran therefore discloses a viewer for 2D views and also for 3D tessellated model data. However, Baran does not disclose any test whether or not a predefined 2D representation is available for a particular object of a 3D model, and there is no choice of using either the predefined 2D representation or a calculated 2D projection in the 2D view.

Itoh discloses calculating a 2D projection of a 3D object. However, Itoh fails to disclose any use of a predefined 2D representation and thus neither discloses a test whether or not a predefined 2D representation is available nor a choice of using either the predefined 2D representation or a calculated 2D projection in the 2D view.

Thus, Applicant submits that independent claims 1, 10 and 16 are allowable over Baran and Itoh since neither Baran nor Itoh teach to choose, when generating a 2D view of a 3D model, between a predefined 2D representation of an object of the 3D model – if such a predefined 2D representation is available – or a calculated 2D projection of the object.

Further, dependent claims 2 - 9, 11 - 15, and 17 - 23 are submitted to be allowable over Baran and Itoh in the same manner, because they are dependent on independent claims 1, 10, and 16, respectively, and thus contain all the limitations of the independent claims. In addition, dependent claims 2 - 9, 11 - 15, and 17 - 23 recite additional novel elements not shown by Baran and Itoh.

VI. Conclusion

The present invention provides for an automatic choice between using a predefined 2D representation of an object in a 2D view – if such a predefined 2D representation is available – or using a calculated 2D projection of the object. This teaching of the present invention is especially advantageous in cases where the predefined 2D representation is different from a 2D projection that could be mathematically calculated from the object. The invention thus makes it possible to use simplified 3D models while still providing high-quality 2D views. Page 5, lines 5 - 14 and the section from page 13, line 30 to page 14, line 5 provide some examples of the particular advantages that are made possible by the present invention.

In view of the above, it is submitted that this application is now in good order for allowance and such allowance is respectfully solicited. Should the Examiner believe minor matters still remain that can be resolved in a telephone interview, the Examiner is urged to call Applicant's undersigned attorney.

Respectfully submitted,

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